

## A Comparative Study of Transabdominal Pre-Peritoneal (TAPP) & Totally Extraperitoneal (TEP) Laparoscopic Techniques for Inguinal Hernia Repair.

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### Abstract

**Background:** The most frequently used laparoscopic techniques for inguinal hernia repair are transabdominal preperitoneal (TAPP) repair and totally extraperitoneal (TEP) repair. **Aim of the study:** The aim of this comparative study was to compare the laparoscopic totally extraperitoneal (TEP) and laparoscopic transabdominal preperitoneal (TAPP) techniques of laparoscopic inguinal hernia repair. **Methods:** The comparative study was conducted between May 2017 and March, 2020 in the Department of Surgery in Anam Medical College & Hospital. There 100 patients who were suffering from uncomplicated primary groin hernia included for the study from the Herniated registry. Patients were divided into Group I (TEP) and Group II (TAPP). In TEP group had 60 study subjects and 40 study subjects includes in TAPP. Data compilation were done in an organized manure. All data analyses were performed with the software SPSS 20 & MS Excel-2016. **Results:** There were significant differences between the two patient groups in respect of a number of other patient characteristics. There found 8.33% for TEP and 7.50% for TAPP, in the intraoperative complications associated with the two surgical techniques. More complications were noted within the first 30 postsurgical days in the TAPP group (15.00%). These were mainly due to the difference in the postoperative seroma rate (TEP 5.00% vs TAPP 12.50%). The coronary heart disease (5.00%), diarrhea (2.50%), exitusletalis (2.50%) found only in TAPP method. **Conclusion:** In the present study, TEP had a significant advantage over TAPP. As there found some complications more in TAPP as TEP. The other intraoperative complications, postoperative complications, and cost were similar in both groups. In terms of results, both repair techniques seemed equally effective, but TEP had an edge over TAPP.

Received: May 2021

Accepted: June 2021

Keywords: TEP, TAPP, Intraoperative Complications, Postoperative Complications, Inguinal Hernia Repair.

## INTRODUCTION

Inguinal hernia repair is the most frequently performed operation in general surgery and the surgical technique has evolved significantly over the past few decades. The most frequently used laparoscopic techniques for inguinal hernia repair are transabdominal preperitoneal (TAPP) repair and totally extraperitoneal (TEP) repair.<sup>[1]</sup> TAPP requires access to the peritoneal cavity with placement of a mesh through a peritoneal incision. This mesh is placed in the preperitoneal space covering all potential hernia sites in the inguinal region. The peritoneum is then closed above the mesh, leaving it between the preperitoneal tissues and the abdominal wall where it becomes incorporated by fibrous tissue.<sup>[1]</sup> TEP repair was first reported in 1993.<sup>[2]</sup> TEP is different in that the peritoneal cavity is not entered and mesh is used to seal the hernia from outside the peritoneum. This approach is considered to be more difficult than TAPP. But the fact is TEP may lessen the risks of damage to the internal organs and of adhesion formation leading to intestinal obstruction, which has been linked to TAPP. Laparoscopic repair is technically more difficult than open repair as well as there is evidence of a "learning curve" in its performance.<sup>[3]</sup> It is likely that some of the higher rates of potentially serious complications reported for laparoscopic repair are associated with learning effects, particularly for the more complex TEP repair. Large randomised

controlled trials such as those conducted by the MRC Laparoscopic Groin Hernia Group and Neumayer and colleagues, both of which compared a predominantly TEP arm with open repair, suggested that TEP has a higher risk of recurrence than open mesh repair.<sup>[4]</sup> However, a systematic review found no statistically significant differences in recurrence rates between TAPP and open mesh repair.<sup>[5]</sup> A prospective randomized study of Krishna A et al. showed that TEP had a significant advantage over TAPP for significantly reduced postoperative pain, which resulted in a better patient satisfaction score.<sup>[6]</sup> A study also found that these two procedures differed only in their minor complication rates and the duration of operation.<sup>[7]</sup> The reasons for these differences were not discussed. TAPP and TEP differ only in terms of the access route, and the inguinal surgical method is similar. If differences are found between the two techniques, these are due either to the use of a different access route, other hernia disease, or to variation of experience among surgeons.<sup>[8]</sup> The aim of this comparative study was to compare the laparoscopic totally extraperitoneal (TEP) and laparoscopic transabdominal preperitoneal (TAPP) techniques of laparoscopic inguinal hernia repair.

## OBJECTIVES

The objective of this study was to compare the laparoscopic TAPP and laparoscopic TEP for inguinal hernia repair which method is associated with

clinical effectiveness & relative efficiency.

## **MATERIALS & METHODOLOGY**

The comparative study was conducted between May 2017 and March, 2020 in the Department of Surgery in Anam Medical College & Hospital. There 100 patients who were suffering from uncomplicated primary groin hernia included for the study from the Herniated registry. Patients were divided into Group I (TEP) and Group II (TAPP). In TEP group had 60 study subjects and 40 study subjects includes in TAPP. Intraoperative variables and postoperative pain scores were recorded in a prestructured form. The relevant participants were adult requiring surgery for repair of inguinal hernia (direct and indirect), children (particularly under the age of 12) were no included. The demographic and surgery-related parameters included age (years), sex (m/f), American Society for Anesthesiologist (ASA) classification (I-IV) as well as the proportion of scrotal inguinal hernias and the hernia defect size based on EHS classification (Hernia type: medial, lateral, femoral, scrotal. Defect size: Grade I =\1.5 cm, Grade II 1.5–3 cm, Grade III (3 cm)).<sup>[9,10]</sup> Laparoscopic TAPP and TEP repair was done conforming to the standard procedural guidelines using three trocars and a 14×10 cm polypropylene mesh, anchored at the level of Cooper's ligament and to the anterior abdominal wall muscles using permanent tacks. The peritoneal opening in TAPP was closed using

absorbable polyglactin suture. The outcomes compared were intraoperative and postoperative course and complications. The dependent variables were intra and postoperative complication rates, number of reoperations as well as absolute and relative frequencies. Data compilation were done in an organized manure. All data analyses were performed with the software SPSS 20 & MS Excel-2016.

## **RESULTS**

As the 100 patients divided in the group of TEP(60 patients) and TAPP(40 patients) did not differ in terms of age or gender distribution. However, there were significant differences between the two patient groups in respect of a number of other patient characteristics. From the overall demographic data, the mean age found 50.04 in TEP and 52.40 in TAPP. Most of the male patients suffer in hernia disease. With this regard there were 52(86.67% male and 8(13.33%) female in TEP group respectively 35(87.50%) found male and 5(12.50%) were female in TAPP group. The more patients 31.67% & 53.33% in TEP as well as 35.00% & 52.50% in TAPP with a lower ASA status (I & II) [Table-1]. According to the surgery related parameters maximum found lateral type hernia in both group 63.33% in TEP and 57.50% in TAPP method. The TAPP technique was also used more often for hernias with medial 32.50%, scrotal 2.50% and femoral 7.50% localization, while the TEP technique was employed more commonly for lateral hernias as

addressed before. The larger hernia defects 67.50% (1.5-3 cm) 20% (>3 cm) underwent the TAPP method [Table-2]. As regards the outcome variables, the two surgical methods differed in terms of duration of operation (<0.0001) and of postoperative length of hospital stay (<0.0001). Both were significantly longer for patients in the TAPP group. The mean duration of operation for the TAPP technique was  $52.67 \pm 22.58$  min, and the median was 47 min (range 22-277 min). The mean duration of operation for the TEP technique at  $47.96 \pm 21.52$  min and median at 45 min (range 22-275 min) was significantly lower. The mean length of hospital stay for the TAPP group patients was  $1.99 \pm 2.31$  days, and for the TEP group patients, it was  $1.89 \pm 2.19$  days (median in each case 2.0 days, range 1-60 days after TEP, 1-64 days after TAPP) [Table-3]. There found 8.33% for TEP and 7.50% for TAPP, in the intraoperative complications associated with the two surgical techniques [Table-4]. Significantly, more complications were noted within the first 30 postsurgical days in the TAPP

group (15.00%). These were mainly due to the difference in the postoperative seroma rate (TEP 5.00% vs TAPP 12.50%). Secondary bleeding occurred more frequently after TEP operation (6.67%), while this was seen more commonly after TAPP operation (7.50%). However, the difference in the postoperative complication rate between TEP and TAPP did not result in any difference in the reoperation rate due to surgical complications (TEP 3.33% vs TAPP 7.50%) i.e., the difference in the postoperative complication rate between TEP and TAPP referred only to postoperative complications that were amenable to conservative treatment. Early recurrences were not a reason for reoperation [Table-5]. In terms of individual general complications, a more complications shown in TAPP (15.00%) than TEP (3.33%) difference was seen for fever 7.50% for TAPP and 1.67% for TEP. Then coronary heart disease (5.00%), diarrhea (2.50%), exitusletalis (2.50%) found only in TAPP method [Table-6].

**Table-1:** Distribute the study people according to the demographic parameters (N=100)

Demographic parameters		TEP (n=60)	TAPP (n=40)	P
Age	Mean $\pm$ SD	50.04 $\pm$ 10.13	52.40 $\pm$ 12.71	0.3057
	Range	21-70	21-70	
Gender	Male	52(86.67%)	35(87.50%)	0.9042
	Female	8(13.33%)	5(12.50 %)	
ASA	I	19(31.67%)	14(35.00%)	0.7299

Score	II	32(53.33 %)	21(52.50%)	0.9354
	III	8(13.33%)	5(12.50 %)	0.9042
	IV	1(1.67 %)	0(0.00%)	0.4137

**Table-2:** Surgery-related parameters of the study people (N=100)

Surgery-related parameters		TEP (n=60)	TAPP (n=40)	P
Hernia type	Medial	17(28.33%)	13(32.50%)	<0.0001
	Lateral	38(63.33%)	23(57.50%)	<0.0001
	Femoral	4(6.67%)	3(7.5%)	0.0627
	Scrotal	1(1.67 %)	1(2.50 %)	<0.0001
Defect size	I (<1.5 cm)	12(20.00%)	5(12.50%)	<0.0001
	II (1.5–3 cm)	38(63.33%)	27(67.50%)	
	III (>3 cm)	10(16.67%)	8(20.00%)	

**Table-3:** Duration of operation and length of stay of the study subjects (N=100)

	Mean	SD	Min	Max	Median	P
Duration of operation (min)						
TEP	47.96	21.52	22	275	45	<0.0001
TAPP	52.67	22.58	22	277	47	
Length of stay (days)						
TEP	1.89	2.19	1	60	2	<0.0001
TAPP	1.99	2.31	1	64	2	

**Table-4:** Intra-operative complications of the study patients (N=100)

Parameter	TEP (n=60)	TAPP (n=40)
Intraoperative complications	5(8.33%)	3(7.50%)
Bleeding	3(5.55%)	2(5.00%)
Injuries (total)	2(3.33%)	1(2.50%)



Vascular	1(1.67%)	1(2.50%)
Bladder	1(1.67%)	1(2.50%)
Bowel	1(1.67%)	1(2.50%)
Nerve	1(1.67%)	0(0.00%)

**Table-5:** Post-operative complications of the study patients (N=100)

Parameter	TEP (n=60)	TAPP (n=40)
Postoperative complications	4(6.67%)	6(15.00%)
Bleeding	4(6.67%)	3(7.50%)
Intestinal lesion	0(0.00%)	1(2.50%)
Impaired wound healing	1(1.67%)	1(2.50%)
Seroma	3(5.00%)	5(12.50%)
Infection	1(1.67%)	0(0.00%)
Intestinal obstruction	0(0.00%)	2(5.00%)
Reoperation	2(3.33%)	3(7.50 %)

**Table-6:** General complications of the study patients (N=100)

Parameter	TEP (n=60)	TAPP (n=40)
General complications	2(3.33%)	6(15.00%)
Fever	1(1.67%)	3(7.50%)
Diarrhea	0 (0)	1(2.50%)
Coronary heart disease	0 (0)	2(5.00%)
Exitusletalis	0 (0)	1(2.50 %)

## DISCUSSION

This comparative study compared of 40 TAPP operations with 60 TEP operations for inguinal hernia on the basis of the perioperative outcomes.

There were significant differences between the two patient groups in respect of a number of other patient characteristics. From the overall demographic data, the mean age found 50.04 in TEP and 52.40 in TAPP. Most

of the male patients suffer in hernia disease. With this regard there were 52(86.67% male and 8(13.33%) female in TEP group respectively 35(87.50%) found male and 5(12.50%) were female in TAPP group. The more patients 31.67% & 53.33% in TEP as well as 35.00% & 52.50% in TAPP with a lower ASA status (I & II). No significant difference was seen in the age ( $P=0.3057$ ) or gender ( $P=0.9042$ ) distribution between the TEP and TAPP groups.

The EHS classification for inguinal hernia has been used for the first time in the Herniated Registry for precise stratification of the patient collective<sup>11</sup>. This makes the study easier to identify variables impacting the outcomes (complications) as well as to identify patient characteristics and method of independent variables that affect the outcome. In the surgery related parameters, we found maximum study subjects as lateral type hernia in both group (63.33% in TEP and 57.50% in TAPP method). The TAPP technique was also used more often for hernias with medial 32.50%, scrotal 2.50% and femoral 7.50% localization, while the TEP technique was employed more commonly for lateral hernias as addressed before. The larger hernia defects 67.50% (1.5-3 cm) 20% (>3 cm) underwent the TAPP method. There found significant differences between the TEP and TAPP groups in terms of the proportion of medial, lateral and scrotal ( $P<0.0001$ ) hernias.

The operating time was slightly longer in both the TEP and TAPP method. The

two surgical methods differed in terms of duration of operation ( $<0.0001$ ) and of postoperative length of hospital stay ( $<0.0001$ ). Both were significantly longer for patients in the TAPP group. The mean duration of operation for the TAPP technique was  $52.67 \pm 22.58$  min, and the median was 47 min (range 22–277 min). The mean duration of operation for the TEP technique at  $47.96 \pm 21.52$  min and median at 45 min (range 22–275 min) was significantly lower. The mean length of hospital stay for the TAPP group patients was  $1.99 \pm 2.31$  days, and for the TEP group patients, it was  $1.89 \pm 2.19$  days (median in each case 2.0 days, range 1–60 days after TEP, 1–64 days after TAPP).

There found 8.33% for TEP and 7.50% for TAPP, in the intraoperative complications associated with the two surgical techniques. More complications were noted within the first 30 postsurgical days in the TAPP group (15.00%). These were mainly due to the difference in the postoperative seroma rate (TEP 5.00% vs TAPP 12.50%). Secondary bleeding occurred more frequently after TEP operation (6.67%), while this was seen more commonly after TAPP operation (7.50%). However, the difference in the postoperative complication rate between TEP and TAPP did not result in any difference in the reoperation rate due to surgical complications (TEP 3.33% vs TAPP 7.50%). The difference in the postoperative complication rate between TEP and TAPP referred only to postoperative complications that were amenable to conservative

treatment. Early recurrences were not a reason for reoperation. In terms of individual general complications, a more complications shown in TAPP (15.00%) than TEP (3.33%) difference was seen for fever 7.50% for TAPP and 1.67% for TEP. Then coronary heart disease (5.00%), diarrhea (2.50%), exitus letalis (2.50%) found only in TAPP method. In summary, these data from the Herniated Registry reveal that there found differences in outcomes between TEP and TAPP. These differences attest to the fact that the patients operated on with the TAPP technique had larger defect sizes and a greater proportion of scrotal hernias. The higher postoperative seroma rate in patients operated on with the TAPP technique, leading postoperative complication rate, is therefore to be

expected. Similar results found in some other studies.<sup>[12,13]</sup>

### ***Limitations of the study:***

The present study had few limitations such as this study was conducted in a single hospital and had a small sample size that may not reflect the whole scenario.

## **CONCLUSION**

Laparoscopic approach for inguinal hernia repair is a safe and viable option with TEP repair having a slight edge over TAPP repair. Most of the study subjects were adult male. The comparison of two procedures differed in their outcomes (complication rates and the duration of operation). No recurrences have occurred in 100 patients in the 2-year follow-up period.

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Source of Support: Nil, Conflict of Interest: None declared